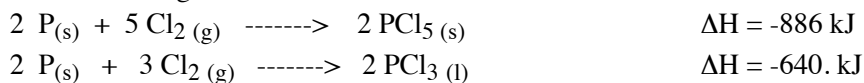


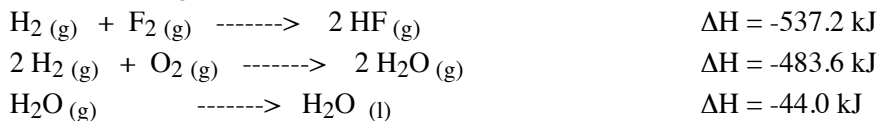
Use Hess's Law to calculate  $\Delta\text{H}$  for this reaction:  $2 \text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \text{ -----} \rightarrow 2 \text{SO}_3(\text{g})$

2. Given the following data:



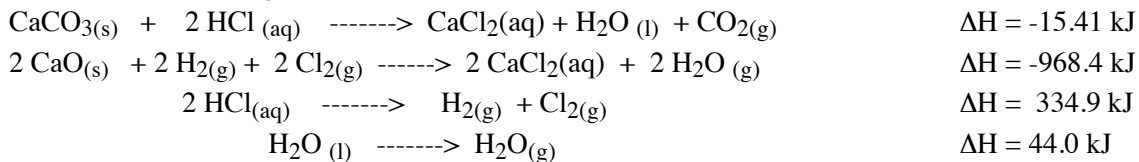
Use Hess's Law to calculate  $\Delta\text{H}$  for this reaction:  $\text{PCl}_3(\text{l}) + \text{Cl}_2(\text{g}) \text{ -----} \rightarrow \text{PCl}_5(\text{s})$

3. Given the following data:



Use Hess's Law to calculate  $\Delta\text{H}$  for this rxn:  $2 \text{F}_2(\text{g}) + 2 \text{H}_2\text{O}(\text{l}) \text{ -----} \rightarrow 4 \text{HF}(\text{g}) + \text{O}_2(\text{g})$

4. Given the following data:



Use Hess's Law to calculate  $\Delta\text{H}$  for this rxn:  $\text{CaCO}_3(\text{s}) \text{ -----} \rightarrow \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$

5. Olive oil contains many types of fat molecules. A typical molecular formula for olive oil is  $C_{57}H_{104}O_6$ , which has a molecular weight of 885.4 amu. When you metabolize (“burn”) olive oil in your body, the following reaction occurs:



- Calculate the energy (in kilojoules) produced when 1.00 gram of  $C_{57}H_{104}O_6$  is metabolized.
- Convert the answer in (a) to kilocalories (1 kcal = 4.184 kJ)
- 1 gram of fat typically contains about 9 dietary calories. How does olive oil compare?
- If 1.00 grams of  $C_{57}H_{104}O_6$  react, how many grams of carbon dioxide gas would be produced (exhaled!)?

6. Ethanol (ethyl alcohol) has the formula  $C_2H_5OH(l)$ .

a. Write a chemical equation for ethanol burning. Balance and include phase subscripts.

b. Without looking at any numbers, predict whether the above reaction will be exo- or endo-thermic, and explain your answer.

When 10.00 grams of ethanol are combusted under constant pressure conditions, the heat released is enough to increase the temperature of 2000. g of water from  $10.0^\circ\text{C}$  to  $42.0^\circ\text{C}$ .

c. Determine the heat energy absorbed/released (which is it?) by the water, in calories.

d. Convert your answer in (c) to kilojoules.

e. Determine how many moles of ethanol burned in the experiment.

f. Determine  $\Delta H_{rxn}$  for the combustion of ethanol in kJ/mole.

g. Write the heat term into the equation in (a).